

164. Aloe fencing has been undertaken to the extent of 32,984 feet in the Sholápur, Mádba, Pandharpur and Sāngola ranges in the Sholápur division, at a cost of Rs. 208-10-6; however useful this kind of fencing may be to define boundaries, and for the protection of the latter, it is useless against trespassing cattle, which make gaps in it where they do not find them ready made. The only reserve at present protected by a wire fence is at Karmála, where about 424 acres have been enclosed; the results from the protection thus secured are very obvious to even the most casual observer; a quantity of strand and barbed wire has been obtained for enclosing other reserves, but there is a difficulty in getting teak posts.

## 7.—NATURAL REPRODUCTION.

165. There is nothing new to add under this heading to the reports of former years. Natural reproduction is very vigorous everywhere in the Thána district whether from seed or from stool; an enormous number of seedlings, however, are killed annually by fires or by cattle, whilst many die in the hot weather; given protection from fire and grazing and mischief, the forests everywhere may be trusted not only to maintain themselves, but to increase in value. The regrowth in the closed compartments which were recently coupes under exploitation is generally vigorous and very luxuriant, so that the regeneration of the forests and their enhanced condition at the end of the rotation now being pursued may be expected with confidence. The new growth in the coupes is principally coppice, but a fair number of seedlings come up: the latter, however, suffer more than the former when fire overruns the compartment. The seeding in the Thána forests was very bad during the year, especially in the case of teak trees; the heads of flowers were numerous on the teak trees, but in most cases became barren, and often where drupes had formed, it was found that the seeds contained had not ripened. A great deal of damage was done to the teak by caterpillars during the rains and up to the second week of November, when they suddenly disappeared; these caterpillars were of small size, greyish black, with a brown head, and were in such myriads that the leaves of all the teak trees in the district were reduced to skeletons of net-work, the caterpillars eating all the parenchyma of the leaves, and leaving only the fibres intact. The effect of this visitation on the trees, especially on young seedlings and coppice shoots, the tender leaves of which were especially toothsome to the caterpillars, must have been disastrous upon the increment of wood, besides weakening the trees; it is a noticeable fact that the trees broke out into new leaf much earlier in 1892 than ordinarily. A partial seedling of the manvel bamboo took place during the year, chiefly in the Máhim range, and seeds have been collected for broad-casting in forests, where the bamboo is not. On the whole, there is no reason to complain of the condition and progress of natural reproduction in the forests of the Thána Collectorate; and if protection continues to be good, even as good as it is now with such an excellent Forest-Collector as Mr. Sinclair in charge of the district, the commercial value of the forests will augment marvellously before the current revolution of the working plans has run its course.

166. In the Khándesh district natural re-production by seed and shoot is retarded in a great measure by the want of complete fire protection and by heavy grazing. In places where these hostile agencies are disappearing reproduction by seed especially is conspicuous, and it is as certain as day succeeds night that where fires are kept out and grazing is regulated under proper control, natural improvement of the forests asserts itself. In the Sátputás, in the Sahyádrí forests, in the Sátomás, in the Jámner teak belt, in the Centrál forests south of the Tápti which were considered to be nearly beyond redemption a few years back, where these conditions of protection have been secured, reproduction by seed is, as a rule, good, and the forests are perceptibly better, blanks having filled and decreased in spread, and fine upright saplings with clean cylindrical stems showing themselves prominently in healthy race for the overhead light. In the bábul forests the exploited coupes, when closed, reproduce themselves quickly if protection is efficient. Some old coupes in the Transpurna forest were traversed by fire in the hot weather of 1891, for the first time after 10 years, and a lamentable destruction of seedlings and saplings is the result: it was intended to open these compartments to cattle after the rains of 1892, but now

they will have to remain closed for a further term of years. In the Anjan (*Hardwickia binata*) forests self-sown seedlings are very scarce at the best of times owing to the Anjan seeding so irregularly and at long intervals; for the last three years not a tree has seeded. Shoots from stools are generally of good growth where, and so long as, goats are excluded; but the Thilaris who bring enormous flocks of sheep have many goats, and where these animals go into a forest there they work destruction of ligneous vegetation, more particularly of the young seedlings and shoots which are not defensible by being beyond the reach of their teeth. Goats attack the bark of the older and taller trees and thus injure them vitally.

167. In the Deccan Collectorates of Násik, Ahmednagar, Poona, Sátára and Sholápur, the rainfall has not been generally favourable to natural reproduction in the forest areas, but notwithstanding this there has been considerable advancement in the development of old trees, and in progressive afforestation of the tracts under reboisement where cattle are strictly excluded. In open forests the herds of cattle trampling the soil stamp out plant life, defeating all efforts of nature in regeneration, while sheep and goats destroy all ligneous vegetation not beyond their reach upon all the lands to which they are allowed access.

168. The rainfall in the Surat division was plentiful and favourable; about 120 inches fell in the Dángs. The high forests here are worked chiefly for large timber, and trees have of necessity to be felled when they have attained a considerable age, when their power of reproduction by coppice shoots has almost disappeared, and in consequence few and feeble shoots are to be seen among the few which have sprung up from the stools where fellings have been made in recent years; this is particularly noticeable in going through the forests round Khubita and Sodmal. But regeneration by self-sown seeds, though retarded by fires, is by no means unsatisfactory, and the greater portion of the Wasurna Dángs and the valleys of Pimpri Dáng, and in many other localities from whence large timber had been extracted during the past decade, are now densely stocked with teak saplings and poles of a most promising character: when shifting cultivation is confined within fixed bounds and demarcated forest areas are closed against its entry, and at the same time fires are kept out, the forests of the Dángs will progress with great strides in the path of improvement and of enhanced wealth. In the Gandeva coupe felled during 1890-91 teak has coppiced very vigorously and densely, new shoots having topped 8 feet in one season. In the Mándvi range also natural reproduction has been good, and in riding through the forests it is very pleasing to notice old sites of cultivation now forest covered with seedling growth of valuable timber, with large trees fringing their borders, teak predominating.

169. There is nothing special to chronicle in respect of the Panch Maháls division, but it may be stated generally that where fires and ovine cattle are kept out, there the forests are improving steadily. A very great advancement was noticed by the Conservator to have taken place, since the time of his former visit, in the forests of the Kalol range on the eastern frontier; and in the forests upon the slopes of Pavagad in the Hálol range, which are now well stocked with saplings.

170. There is scarcely any land in Western India which cannot be made to grow fodder bushes, fuel scrub and good grass with care and perseverance, so long as men and cattle are excluded while the ligneous vegetation is in its infant stage, and the roots of grasses and other plants are working actively in the formation of soil; when there is a fair growth on the ground bovine cattle can be admitted for a short period yearly when the demand for grazing is the chief consideration, but the strict exclusion of goats and sheep for a long series of years is of absolute necessity. In cases where the forest lands brought under plantation originally contained good soil, there the growth of timber is not a long process; for example, the bábul forests in the Sholápur division which have been created while the writer of this report has been Conservator of Forests of the Circle containing the Sholápur division, are now being divided into blocks, with 40 compartments each, for working, and coupes will be sold for exploitation next season, which will produce not less than Rs. 10,000 in receipts. Hill slopes in the Deccan come on more slowly but hundreds of square miles in the

Khándesh, Násik, Ahmednagar, Poona, Sátára and Sholápur divisions which have been treated since 1879 for reboisement, are now showing a promising growth of saplings: the Bársi hills in the Sholápur division being a conspicuous example. But the undulating uplands or máls in the Deccan are the toughest to deal with, and though fodder bushes and scrub fuel bushes will appear upon them, it will occupy the better part of 50 years to cover them with timber.

### 8.—ARTIFICIAL REPRODUCTION.

171. In the Thána Collectorate operations are confined to—

- (a) old plantations and kurans.
- (b) the exploited coupes (closed forests).
- (c) acquired occupied lands within the boundaries of forest reserves such for instance upon the catchment of the Tánsa lake.

Forest guards planted up patches within their own beats as part of their regular work. Seeds were collected by guards and by hired labour.

172. In the North Thána division 7,204 acres were under cultural treatment, transplants from surrounding forests being moved into the exploited coupes of the season. Sandalwood was planted in every range on a small scale in specially selected and prepared sites. The total cost of the works amounted to Rs. 855. In the South Thána division 225 acres outside the coupes recently closed were planted up, and 122 acres of plantation were made by forest guards in their respective beats: some of these were doing very well in the hot weather, especially in the Koshimshet, Sakurlé, Chargaon, Sháhápur and Umgaon forests.

173. In the East Khándesh division 56 khandis 2 maunds and 9 seers of seeds were sown over 3,020 acres of Reserved Forest, of which 573 acres were treated by dibbling, 599 acres of bábul reserves by full ploughing, 1,823 acres were pitted over and sown, and 25 acres were broad-casted. Mr. Desái reports the results in the South Tápti ranges to be unsuccessful, but in the North Tápti forests to be promising.

174. In the West Khándesh division 72,200 acres were broad-casted over with seeds and upon 297 acres dibbling has had recourse to, while 5 acres in a bábul reserve were ploughed and sown. As the rains were heavier than usual, the seedlings made a fair start, but later on a large number of them withered away. Seedlings which had been grown in pots in the Dhulia and Dahivel nurseries were planted out in the forest areas with fair success.

175. The rains were scanty and late in coming to the Násik district, and the plantations did not do so well in consequence as could be desired; many seedlings died during the hot weather. Each forest guard planted up his five acres in the forests of his beat, sandalwood plantations were started on a small scale in each range, seed having been obtained from Coorg, but a large proportion did not germinate, and many plants did not survive the hot weather.

176. In 1890 a plantation was started at Páthardi at the foot of the Lena hill in the Násik range, about 6 miles from the city of Násik: its site is of an old tank, the dam of which must have been swept away many years ago, and it is full of deep alluvial soil. This plantation has been watered from the old Buddhist caves carved in the low scarp that runs across the north face of Pándao-Lena hill, about half way up or over 600 feet above the plantation. All the caves contain cisterns cut out in the rock to hold water; these cisterns have small mouths and spread inside into a large quadrangular hollow, and are full of water. At the outset a tin half-round pipe about 700 feet in length was fixed from the caves to the plantation, and a man used to go up to the caves and pour water into the tube on the top, and another man caught it at the bottom in buckets: but last year it was suggested that the use of a syphon to bring the water down would be of advantage, and Mr. Betham has now fitted one which works admirably; 50 feet of iron piping 1 inch in diameter fitted at each end with a brass cock was obtained from Bombay at a cost of Rs. 13, and a large iron tank purchased for Rs. 64 has been placed in the plantation, and 400 feet of additional tin piping costing 9 annas per running foot had to be fixed to the old gutter, and now a forest guard goes up to the cave and turns a cock which allows the water to run down the pipe and fill the iron tank 4' x 4' in the plantation, which is